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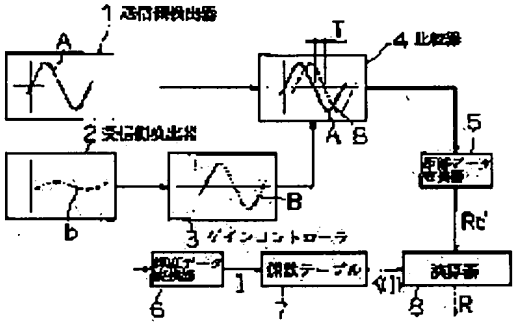
(54) DATA PROCESSOR OF LASER RANGE FINDER

(57)Abstract:
PURPOSE: To provide a data processor, of laser range finder, which can increase the accuracy of distance measurement.
CONSTITUTION: The data processor of laser range finder is provided with a transmission-side detector 1 which detects reference light, with a reception-side detector 2 which detects reflected light and with a gain controller 3 which increases the amplitude of the reflected light detected by the reception-side detector 2, it compares the reference light with the reflected light which is amplified by the gain controller 3, and it computes the distance to a target on the basis of the going and returning time of a laser beam. The data processor is provided with a brightness data converter 6 which converts the intensity of the reflected light detected by the reception-side detector 2 into a brightness value, with a coefficient table 7 in which coefficients for correction are set, correspondingly to the brightness values and with an operation unit 8 which computes a measured distance by using distance data computed on the basis of the going and returning time of the laser beam and by using the factor table 7.



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CLAIMS

[Claim(s)]
[Claim 1] The transmitting-side detector which detects the reference beam irradiated by the target, and the receiving-side detector which detects the reflected light, It has the gain controller which increases the amplitude of the reflected light detected with the receiving-side detector. In the data processor of the laser range finder which computes the distance from the both-way time amount of a laser beam to a target by comparing a reference beam with the reflected light amplified by the gain controller The brightness data converter which changes into a brightness value the reinforcement of the reflected light detected with the receiving-side detector, The data processor of the laser range finder characterized by having the computing element which computes measurement distance using the multiplier table which set up the multiplier for amendment corresponding to a brightness value, and the distance data and the multiplier table which were computed from the both-way time amount of a laser beam.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application] This invention relates to the data processor of the laser range finder (laser distance measuring equipment) used for range measurement, image recognition, etc. to a target.
[0002]
[Description of the Prior Art] As shown in drawing 3 , the data processor of this kind of laser

range finder compares the phase A of a reference beam and the phase B of the reflected light from a target which irradiated the target, detects the both-way time amount T of the laser beam which is that phase contrast, and computes the distance from the both-way time amount T to a target.

[0003] Moreover, since the reflected light served as the phase b with the small amplitude in the above-mentioned data processor as the reinforcement of the reflected light falls and an imaginary line shows in drawing 3 when the distance to a target is far, or when the incident angle of the reference beam to a target is small, it is made the phase (B) which the amplitude of the phase b of the reflected light is increased by the gain controller, and is easy to compare with a reference beam, and he detects the back [this] round trip time amount T, and was trying to convert into distance.

[0004] The data processor of such a laser range finder is indicated by the 287-289th page of "newest defense technical TAISEI" which the R&D planning published in February, Showa 60.

[0005]

[Problem(s) to be Solved by the Invention] By the way, in the data processor of a laser range finder which was described above, a time gap (delay) may arise in the phase of the reflected light made to amplify with the circuit property of a gain controller. This phase shift is in the inclination which becomes large as the output of a gain controller increases. For this reason, when especially the reinforcement of the reflected light was small, since the output of a gain controller was increased corresponding to this, the improvement when there is nonconformity that the error of the measurement distance over a distance actual as a result becomes large and distance measuring accuracy is raised was required.

[0006]

[Objects of the Invention] This invention was accomplished in view of the conventional situation which was described above, and aims at offering the data processor of the laser range finder which can raise distance measuring accuracy.

[0007]

[Means for Solving the Problem] The data processor of the laser range finder concerning this invention The transmitting-side detector which detects the reference beam irradiated by the target, and the receiving-side detector which detects the reflected light, It has the gain controller which increases the amplitude of the reflected light detected with the receiving-side detector. In the data processor of the laser range finder which computes the distance from the both-way time amount of a laser beam to a target by comparing a reference beam with the reflected light amplified by the gain controller The brightness data converter which changes into a brightness value the reinforcement of the reflected light detected with the receiving-side detector, It is considering as the configuration equipped with the computing element which computes measurement distance using the multiplier table which set up the multiplier for amendment corresponding to a brightness value, and the distance data and the multiplier table which were computed from the both-way time amount of a laser beam, and the above-mentioned configuration is made into The means for solving a technical problem.

[0008] In addition, the multiplier for amendment in a multiplier table is set up as a value for amending the error of the distance data produced by the time lag of a phase based on the relation between the output of the gain controller which increases to lowering of the reinforcement of the reflected light, and a time gap of the phase of the reflected light which becomes large with buildup of the output.

[0009]

[Function of the Invention] In the data processor of the laser range finder concerning this invention When the reinforcement of the reflected light is small, the output of a gain controller increases corresponding to this. Since a time gap of the phase of the reflected light becomes large with the output buildup, while computing the distance data from the both-way time amount of a laser beam to a target by comparing a reference beam with the reflected light amplified by the gain controller The measurement distance which removed the error of the distance data produced by the time lag of a phase is acquired by changing the reinforcement of the reflected light into a brightness value, and amending distance data in a computing element using the

multiplier for amendment of the multiplier table corresponding to this brightness value by the brightness data converter.
[0010]
[Example] Hereafter, one example of this invention is explained based on a drawing.
[0011] Namely, the data processor of a laser range finder The transmitting-side detector 1 which detects the reference beam (a phase A shows) transmitted from transmitting optical system as shown in drawing 1 , The receiving-side detector 2 which detects the reflected light (a phase b shows) which received by receiving optical system, It has the comparator 4 which compares the phase A of a reference beam, and the phase B of the reflected light amplified by the gain controller 3 with the gain controller 3 for increasing the amplitude of the phase b of the reflected light detected with the receiving-side detector 2, and detects the both-way time amount T of a laser beam.
[0012] Furthermore, the distance data converter 5 from which a data processor changes into the distance data Rd of a digital signal the both-way time amount T detected by the comparator 4, While having the brightness data converter 6 which changes into the brightness value I of a digital signal the reinforcement of the reflected light detected with the receiving-side detector 2 It has the computing element 8 which computes the measurement distance R using the multiplier table 7 which set up the multiplier K for amendment corresponding to the brightness value I of the reflected light, and the distance data Rd and the multiplier table 7.
[0013] The multiplier K of the multiplier table 7 is a value for amending the error of the distance data Rd produced by the time lag of the phase B of the reflected light based on the relation between the output of the gain controller 3 which increases to lowering of the reinforcement of the reflected light, and a time gap of the phase B of the reflected light which becomes large with buildup of the output. The relation between this multiplier K and the brightness value I is expressed with a graph as shown in drawing 2 (a).
[0014] Moreover, in this example, the brightness value I has the value of 0-255 by 8 bits, i.e., 256 gradation, and as shown in drawing 2 (b), the multiplier K for the amendment based on a previous graph is set as each brightness value (0-255) I at the multiplier table 7. In addition, when the numeric value on expedient is put into the multiplier table 7 shown in drawing 2 (b), and it explains, and the brightness value I is 2, for example, a multiplier K is set to "100" and the brightness value I of a multiplier is "0" in the range near 255 and this.
[0015] In a computing element 8, the measurement distance R is computed from the distance data Rd, the brightness value I, and a multiplier K. The measurement distance R is found by the degree type and R=Rd-K (I).
[0016] In the above-mentioned data processor, in a comparator 4, the both-way time amount T of a laser beam is computed by comparing the phase A of the reference beam detected with the transmitting-side detector 1 with the phase B of the reflected light amplified by the gain controller 3, and the both-way time amount T of a laser beam is changed into the distance data Rd to a target in the distance data converter 5.
[0017] When the amplitude of the phase b of the reflected light detected with the receiving-side detector 2 is small at this time when the reinforcement of the reflected light is small that is, in order to compensate this, the output of the gain controller 3 increases, and the time gap of the phase B of the reflected light is large with that output buildup. Therefore, the error by the time lag of the phase B of the reflected light is included in the distance data Rd.
[0018] So, in a data processor, the measurement distance R which removed the error of the distance data Rd and the distance data Rd produced by the time lag of the phase B of the reflected light by calculating with a computing element 8 using the multiplier K for amendment of the multiplier table 7 corresponding to the brightness value I is acquired in the brightness data converter 6 by changing into the brightness value I the reinforcement of the reflected light detected with the receiving-side detector 2. Thus, in the above-mentioned data processor, even if it is the case that the reinforcement of the reflected light is small, the exact measurement distance R will be acquired.
[0019] Moreover, the above-mentioned data processor is used not only for the range measurement to a predetermined target but for the image recognition which makes a laser range

finder an input source. In this case, by scanning a laser beam, an image with 128x64 pixels and a depth of 8 bits will be formed, and data processing described above about each pixel of an image on this occasion is performed.
[0020] Although an error will arise to distance data by this when a part with the small reinforcement of the reflected light (pixel) is in a scanning zone even if it is, when performing such image recognition, by amending distance data according to the brightness value of the reflected light, an exact measurement distance is acquired for every pixel, and an image with a precision high as a whole is obtained.
[0021]
[Effect of the Invention] According to the distance to a target, the incident angle of a reference beam, etc., since measurement distance is acquired by amending the distance data computed from the both-way time amount of a laser beam according to the brightness value of the reflected light according to the data processor of the laser range finder of this invention as explained above, even if it is the case that the reinforcement of the reflected light is small, most errors of the measurement distance over a actual distance can be abolished, and the accuracy of measurement can be raised substantially.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is a block diagram explaining one example of the data processor of the laser range finder concerning this invention.
[Drawing 2] It is drawing (b) showing the graph (a) and multiplier table showing the relation between a brightness value and the multiplier for amendment.
[Drawing 3] It is a graph explaining the Gentlemen phase of the reflected light in the condition that a reference beam, the reflected light, and reinforcement fell.
[Description of Notations]
1 Transmitting-Side Detector
2 Receiving-Side Detector
3 Gain Controller
6 Brightness Data Converter
7 Multiplier Table
8 Computing Element

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最終頁に続く

(54)【発明の名称】　空気調和機の風向変更装置

1

【特許請求の範囲】

【請求項１】下面パネルの４辺に空気吹出口を設け、これら吹出口に風向変更羽根を夫々設けた空気調和機において、下面パネルの１つのコーナー部にはこのコーナー部と隣接する第１、第２の風向変更羽根の揺動させるための揺動手段を設けると共に、下面パネルの対角線上に位置する他の２つのコーナー部には第１の風向変更羽根と同期して第３の風向変更羽根を、且つ第２の風向変更羽根と同期して第４の風向変更羽根を夫々揺動させるための連動手段を設け、これらの風向変更羽根の揺動方向をいずれも同一に設定したことを特徴とした空気調和機の風向変更装置。

【発明の詳細な説明】

（イ）産業上の利用分野

本発明は４方向吹出しの天井埋込型空気調和機に組み込

2

まれる風向変更装置に関する。

（ロ）従来の技術

下面パネルの４辺に空気吹出口を設けた天井埋込型空気調和機が特開昭60－44735号公報で提示されている。そして、夫々の空気吹出口には風向変更板を設けて、冷房時に斜め下方向へ、暖房時に直下方向へ吹出空気を案内するようにした形態で既に実用化されている。

（ハ）発明が解決しようとする問題点

風向変更板は手動で向きを変えるようになっているために踏台等に乗って操作しなければならず、面倒であった。

しかも冷気は降下し、暖気は上昇するために、冷房時には斜め下方向へ、暖房時には直下方向へ吹き出させているので、冷房時には温度むらが余り生じないが、暖房時には空気吹出口の真下にいる人に常時、温風が当たり、

不快感を与えてしまう問題があった。

本発明はかかる問題点を解決した空気調和機の風向変更装置を提供するものである。

（ニ）問題点を解決するための手段

本発明は下面パネルの４辺に風向変更板が備えられた空気吹出口を設ける一方、下面パネルの１つのコーナー部にはこのコーナー部と隣接する第1,第２の風向変更板を揺動させるための駆動手段を設けると共に、下面パネルの対角線上に位置する他の２つのコーナー部には第１の風向変更板と同期して第３の風向変更板を、且つ第２の風向変更板と同期して第４の風向変更板を夫々揺動させるための連動手段を設け、これらの風向変更羽根の揺動方向をいずれも同一に設定したものである。

（ホ）作用

１つの駆動手段で第１、第２の風向変更羽根の揺動させると、２つの連動手段で第３の風向変更羽根が第１の風向変更羽根と同期して、且つ第４の風向変更羽根が第２の風向変更羽根と同期して夫々揺動する。すなわち、これら４つの風向変更羽根がいずれも下面パネルの真下方向もしくは斜め下方向というように同一となり、空気調和機のまわりでは略均一な空調が行われる。

（ヘ）実施例

第１図は天井埋込型空気調和機の底面図、第２図は第１図のII－II′断面図、第３図は風向変更装置の要部を示す底面図であり、天井埋込型空気調和機は内壁に断熱材（１）を貼着した板金製のユニット本体（２）と、中央に吸込グリル（３）を、周辺部の４辺に風向変更板（4a）（4b）（4c）（4d）付きの空気吹出口（5a）（5b）（5c）（5d）を設けた通風用の下面パネル（６）とから構成されている。

（７）は吸込グリル（３）からエアーフィルター（８）を介して室内空気をターボファン（９）に吸入案内するノズル口、（10）はノズル板（11）に支持脚（12）で取りつけられたファン用モーター、（13）はノズル口（７）の外周に沿って配設された環状のドレンパン、（14）はターボフアン（９）を囲むように配設された環状の熱交換器、（15）はユニット本体（２）を天井板（16）の天井穴（17）から天井空間（18）内に押し込んで天井梁（19）へ吊り下げ固定するための吊りボルトである。

そして、下面パネル（６）の１つのコーナー部（20a）にはこのコーナー部と隣接する第1,第２の風向変更板（4a）（4b）を揺動させるための駆動手段（21）が設けられており、又、下面パネル（６）の対角線上に位置する他の２つのコーナー部（20b）（20c）には第１の風向変更板（4a）と同期して第３の風向変更板（4c）を、且つ第２の風向変更板（4b）と同期して第４の風向変更板（4b）を夫々揺動させるための連動手段（22）（23）が設けられている。

（24a）（24b）（24c）（24d）は夫々のコーナー部（20a）（20b）（20c）（20d）をカバーする蓋で、下方向へ取り外すと第３図に示すように駆動手段（21）と連動手段（22）（23）とが見えるようになっている。駆動手段（21）はモーター（図示せず）で矢印方向に回転される主歯車（25）と、この主歯車と噛み合って矢印方向に回転する従歯車（26a）（26b）と、これら従歯車に180°ずらして設けられたピン（27a）（27b）と、これらピンに長孔（28a）（28b）が嵌まり合って支点（29a）（29b）を中心に揺動するアーム（30a）（30b）と、これらアームの先端（31a）（31b）に孔（32a）（32b）が嵌まり合って矢印方向に揺動され、第1,第２の風向変更板（4a）（4b）に矢印方向の動力を伝えるカム（33a）（33b）とから構成されている。又、一方の連動手段（22）は第１の風向変更板（4a）の他端側の太軸（34a）と、第３の風向変更板（4c）の一端側の太軸（34c）と、この両軸に両端がきつく嵌め合わされたコイルスプリング（35）とから構成されており、他方の連動手段（23）も第２の風向変更板（4b）の他端側の太軸（34b）と、第４の風向変更板（4d）の一端側の太軸（34d）と、この両軸に両端がきつく嵌め合わされたコイルスプリング（36）とから構成されている。

かかる構成により、吸込グリル（３）からノズル口（７）を経てターボファン（９）内に吸入された室内空気はターボファン（９）から全周方向へ吐出された後、熱交換器（14）を通過する際に冷房時に冷却され、暖房時に加熱される。そして、冷却又は加熱された空気が吹出口（5a）（5b）（5c）（5d）から４方向へ吹き出される際、後述の如く上下方向へ揺動する風向変更板（4a）（4b）（4c）（4d）で斜め下向き方向、真下方向へと吹出方向が連続的に変わる。

即ち、冷暖房運転が開始されると、モーターが低速で駆動して駆動手段（21）の主歯車（25）が第３図に示す矢印方向へ回転されるため、従歯車（26a）（26b）は矢印方向へ回転される。第３図に示した状態はアーム（30a）（30b）の先端（31a）（31b）が内側方向へ最も向き第1,第２の風向変更板（4a）（4b）が第２図に示すように斜め下向きになった時であり、この時、第3,第４の風向変更板（4c）（4d）も連動手段（22）（23）により、第1,第２の風向変更板（4a）（4b）と同期して斜め下向き状態となっている。

そして、この状態から主歯車（25）が90°回転すると、ピン（27a）（27b）が夫々鎖線の位置（$27a_1$）（$27b_1$）に移動し、更に主歯車（25）が90°回転するとピン（27a）（27b）が夫々鎖線の位置（$27a_2$）（$27b_2$）に移動する。この時、アーム（30a）（30b）の先端（31a）（31b）が第３図に示す状態とは逆方向に向いた状態となり、第1,第２の風向変更板（4a）（4b）と、これと同期して揺動した第3,第４の風向変更板（4c）（4d）とは第２図に鎖線で示すように真下方向へ向いた状態となる。

そして、この状態から主歯車（25）が90°回転すると、

5

ピン（27a）（27b）が夫々鎖線の位置（$27a_3$）（$27b_3$）に移動し、更に主歯車（25）が90°回転するとピン（27a）（27b）が夫々実線の元の位置に戻って再び第１乃至第４の風向変更板（4a）（4b）（4c）（4d）は斜め下向き状態となる。これが１分間に６回繰り返して行なわれることにより、上述したように冷風又は温風の吹出方向が斜め下向き方向から真下方向へ連続的に変えられる。尚、上記一実施例では連動手段（22）（23）としてコイルスプリング（35）（36）を用いたが、この代わりに一対のかさ歯車を噛み合わせて用いるようにしても良い。このように第１ないし第４の風向変更羽根（4a）（4b）（4c）（4d）を同時に同一方向すなわち下面パネル（６）の真下方向もしくは斜め下方へ向く（揺動）ようにしたので、空気調和機のまわりでは略均一な空調が行われる。

（ト）発明の効果

本発明によれば、空気調和機の下面パネルの４辺から吹き出される冷温風の吹出方向を風向変更板で自動的に変えるようにしたので、特に暖房時に温風が常時、人体に当って不快感を与えるのを防止できると共に、かかる不快感の解消により吹出風速を高めに設定できるために温風を足元まで到達させることができる。しかも、４つの＊風向変更羽根はいずれも下面パネルに対して同一方向を向くように設定したので、この空気調和機のまわりでは温度むらの少ない快適な暖房効果（略均一な空調）を得ることができる。更に、冷房時はいずれの風向変更羽根も下面パネルの斜め下方向とすることによって、空気調和機のまわりでは冷風によるドラフト感を防止できる。一方暖房時はいずれの風向変更羽根も下面パネルの真下方向とすることによって、空気調和機のまわりへ速やかに温風を導くことができる。

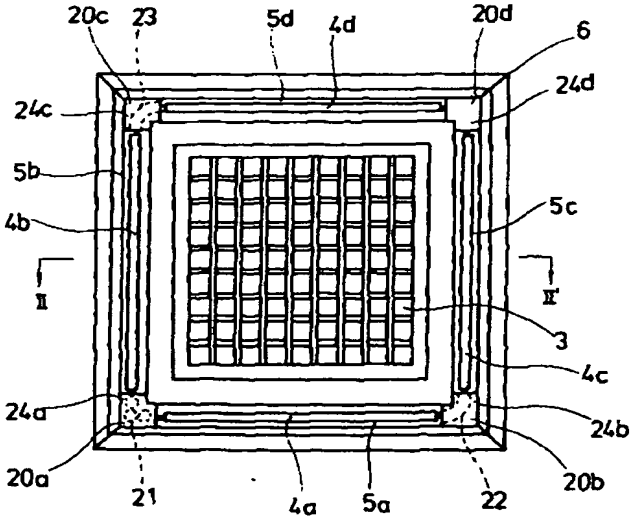
しかも、４枚の風向変更板は１個のモーターによる駆動手段と簡易な２個の連動手段とで揺動されるのでモーターを風向変更板に個々に設ける構造と比較して安価に製造することができる。

【図面の簡単な説明】

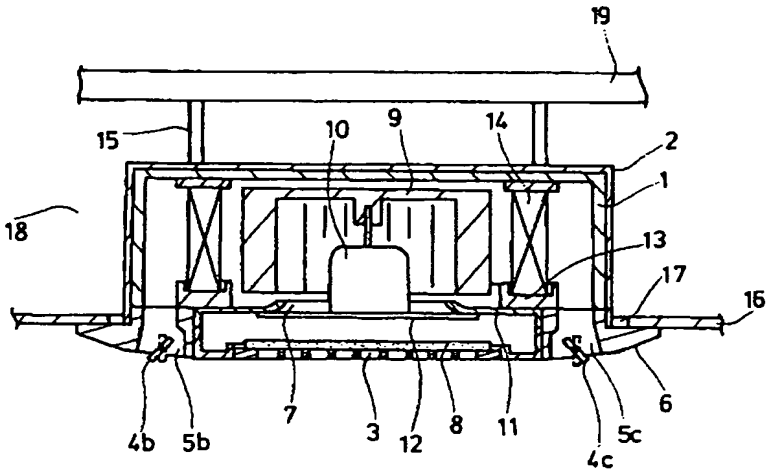
図面は本発明の実施例を示すもので、第１図は天井埋込型空気調和機の底面図、第２図は第１図のII－II′断面図、第３図は風向変更装置の要部を示す底面図である。

（4a）（4b）（4c）（4d）……風向変更板、（5a）（5b）（5c）（5d）……空気吹出口、（６）……下面パネル、（20a）（20b）（20c）……コーナー部、（21）……駆動手段、（22）（23）……連動手段。

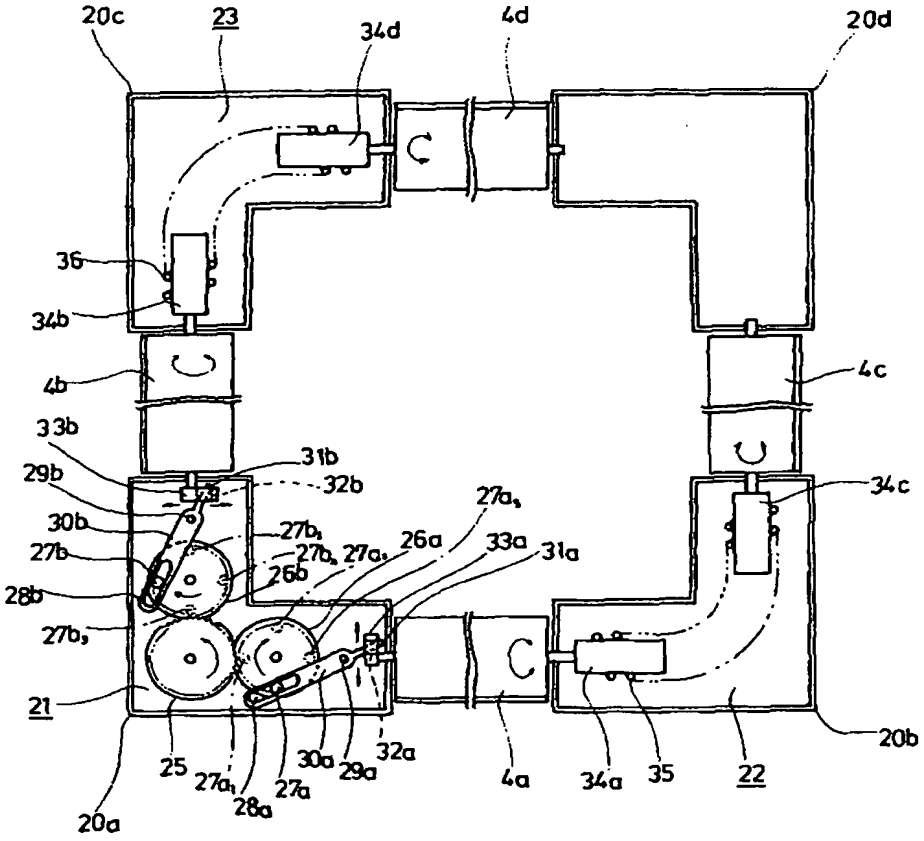
【第１図】



【第2図】


19
15
10
9
14
2
1
18
13
17
16
7
3
12
8
11
6
4b
5b
5c
4c

【第3図】


20c
23
34d
4d
20d
36
34b
4b
4c
33b
31b
29b
32b
34c
27a₃
30b
27b₂
27a₂
27a₁
26a
33a
31a
27b
26b
28b
27b₃
21
20b
25
27a₁
30a
29a
32a
4a
34a
35
22
20a
28a
27a

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(56)参考文献　実開　昭60－82127（ＪＰ，Ｕ）
実開　昭62－117463（ＪＰ，Ｕ）
実開　昭62－76858（ＪＰ，Ｕ）

【公報種別】特許法（平成６年法律第１１６号による改正前。）第６４条の規定による補正
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F24F 13/15 A
1/00 401 C

【手続補正書】
１　第５欄２２行～第６欄９行「到達させる……ができる。」を「到達させることができる。しかも、４つの風向変更羽根はいずれも下面パネルに対して同一方向を向くように設定したので、この空気調和機のまわりでは温度むらのない少ない快適な暖房効果（略均一な空調）を得ることができる。」と補正する。

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